

# Developing Sonoma Water's Roadmap to the Future

Impacts of  
Condition Assessment  
and Master Planning

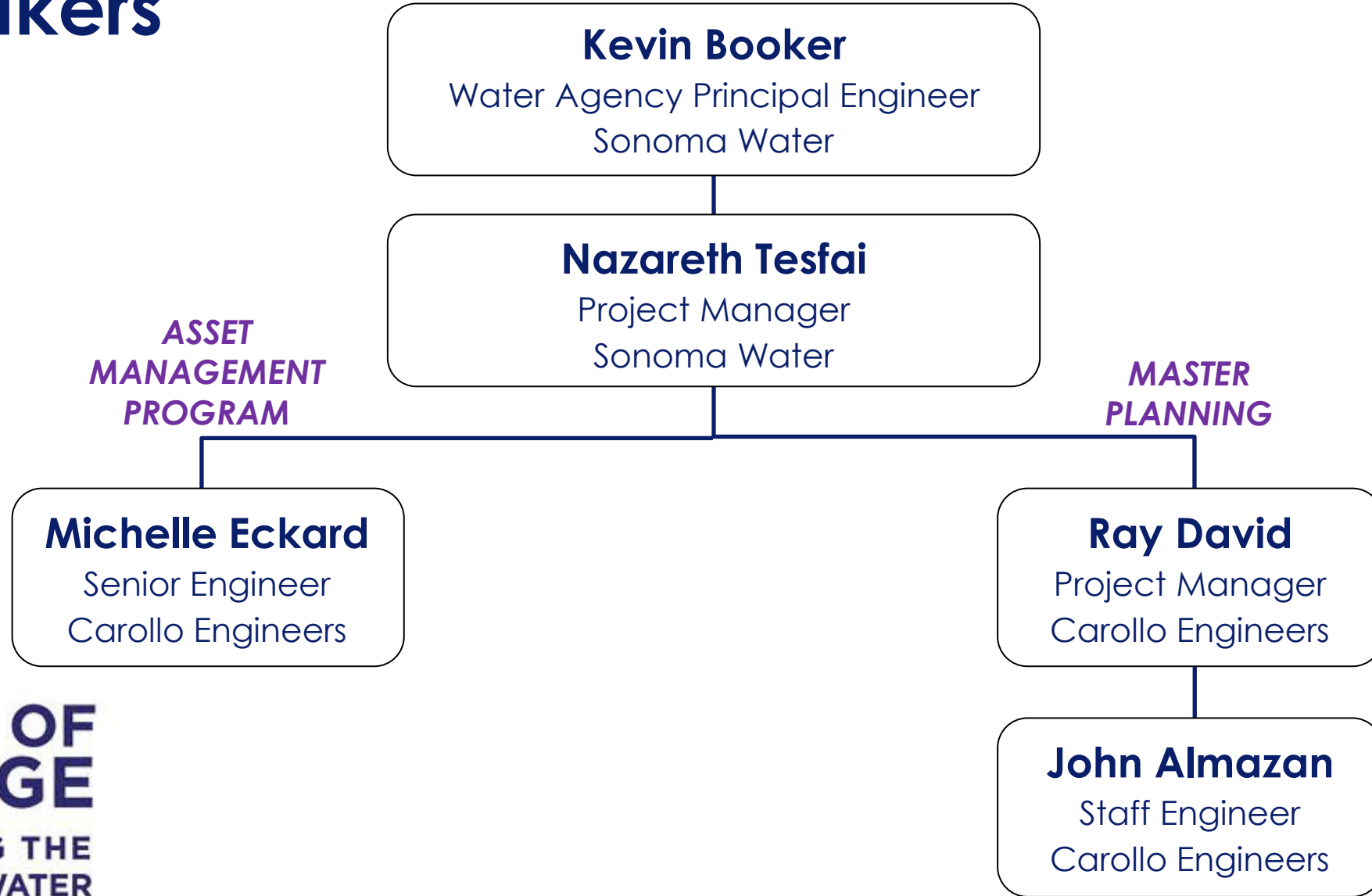
# Introduction

This presentation will highlight:

- Agency-wide asset management program
  - Asset management across multiple Sonoma Water plants and facilities
- Incorporation of condition assessment results into master planning
- CIP for Sonoma Valley WWTP



# Speakers



# Agenda

- Introductions
- Sonoma Water
  - Agency Overview
  - Asset Management Program
  - Master Plan and CIP
- Learned Outcomes and Successes



# WAVES OF CHANGE

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## Sonoma Water

Agency Overview

# Sonoma Water Overview



## Sonoma Water

SERVING THE COMMUNITY SINCE 1949

### Sonoma Water Vision

*Ensuring resilient water resources now and for future generations.*

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Water Supply



Sanitation



Flood Protection Services



# Future Planning Objectives



**Sonoma  
Water**

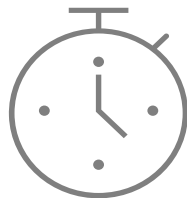
SERVING THE COMMUNITY SINCE 1949

*“Recommended projects, programs, and policies were developed to align with Sonoma Water’s overall vision of **ensuring resilient water resources now and for future generations.**”*

*– SVCSD Master Plan*



- Asset Management Program Agency-Wide
  - **Began in 2019**



- 20-Year Master Plan for SVTP/ALW
  - **CIP from 2023 – 2043**

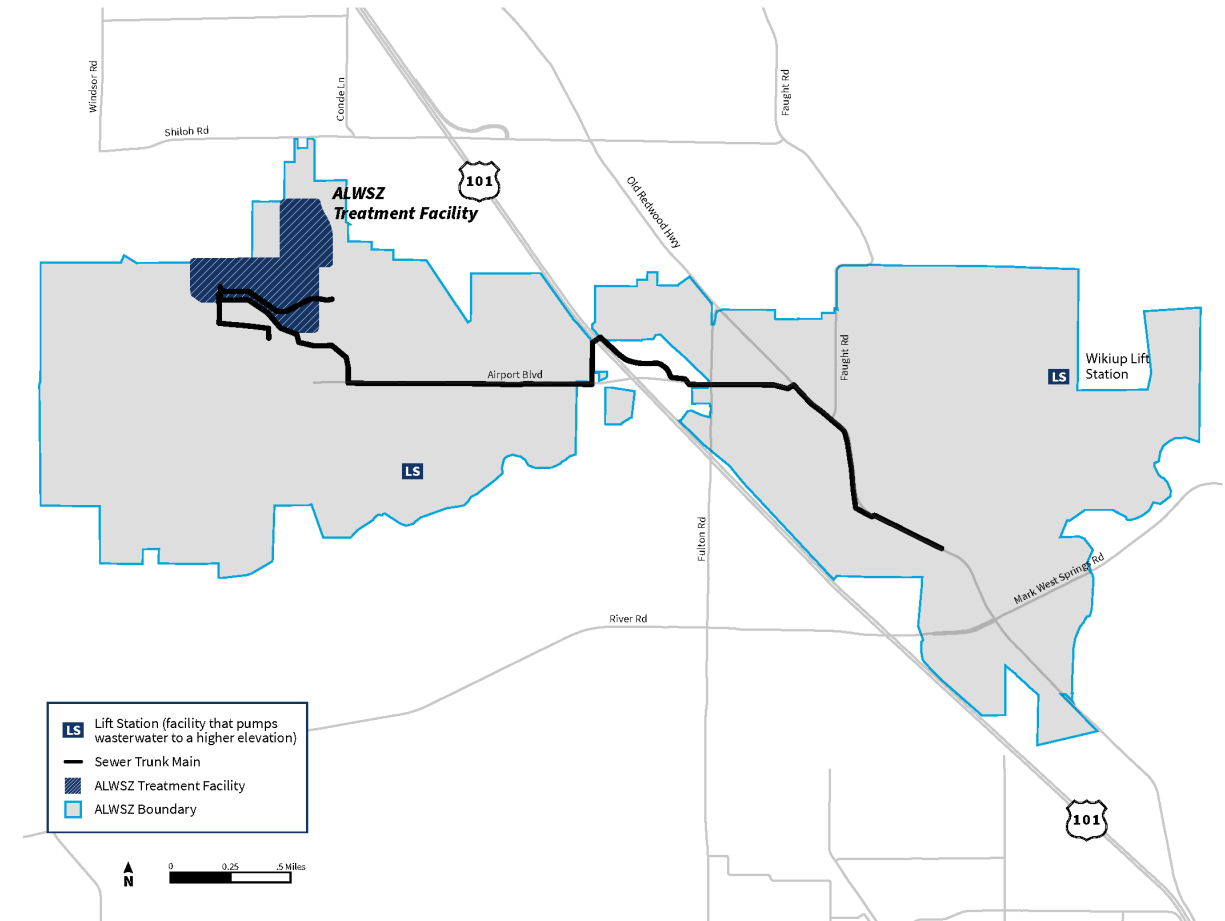
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**CWEA**

# Airport/Larkfield/Wikiup Sanitation Zone

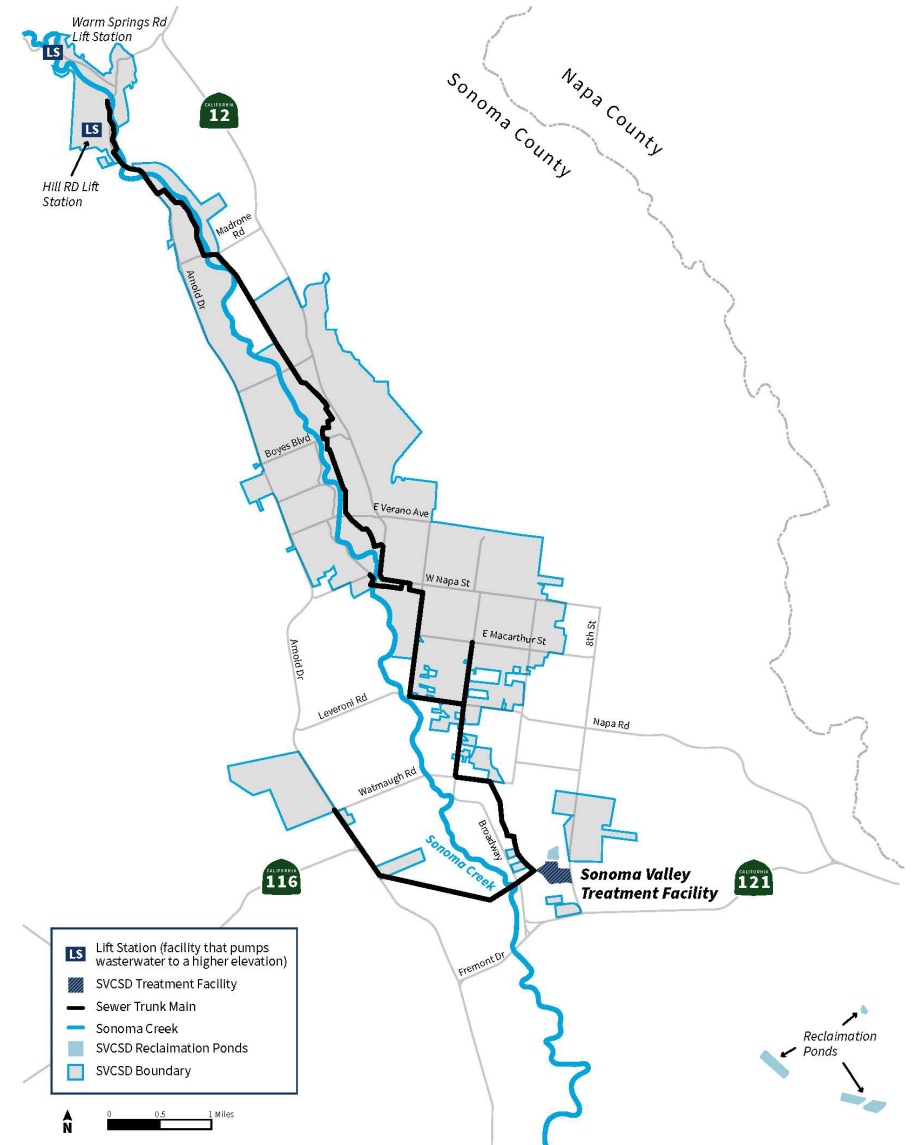
- ALWSZ Service Area
  - 2,100 acres
  - 4,070 equivalent single-family dwellings
- Began operation in 1983
- Design Capacity:
  - 0.9 mgd ADWF
  - 5.0 mgd PWWF
- New partnership with City of Windsor



Source: "Sonoma Valley County Sanitation District," Sonoma Water, accessed April 29, 2024, <https://www.sonomawater.org/alwsz>.

# Sonoma Valley WWTP Service Area and Population

- SVCSD Service Area
  - 4,500 acres
  - 17,791 equivalent single-family dwellings
- Current Population
  - 2023 Population: 35,429
- Buildout Population
  - Assumed annual growth of 0.88%
  - Estimated 2043 Population: 45,457



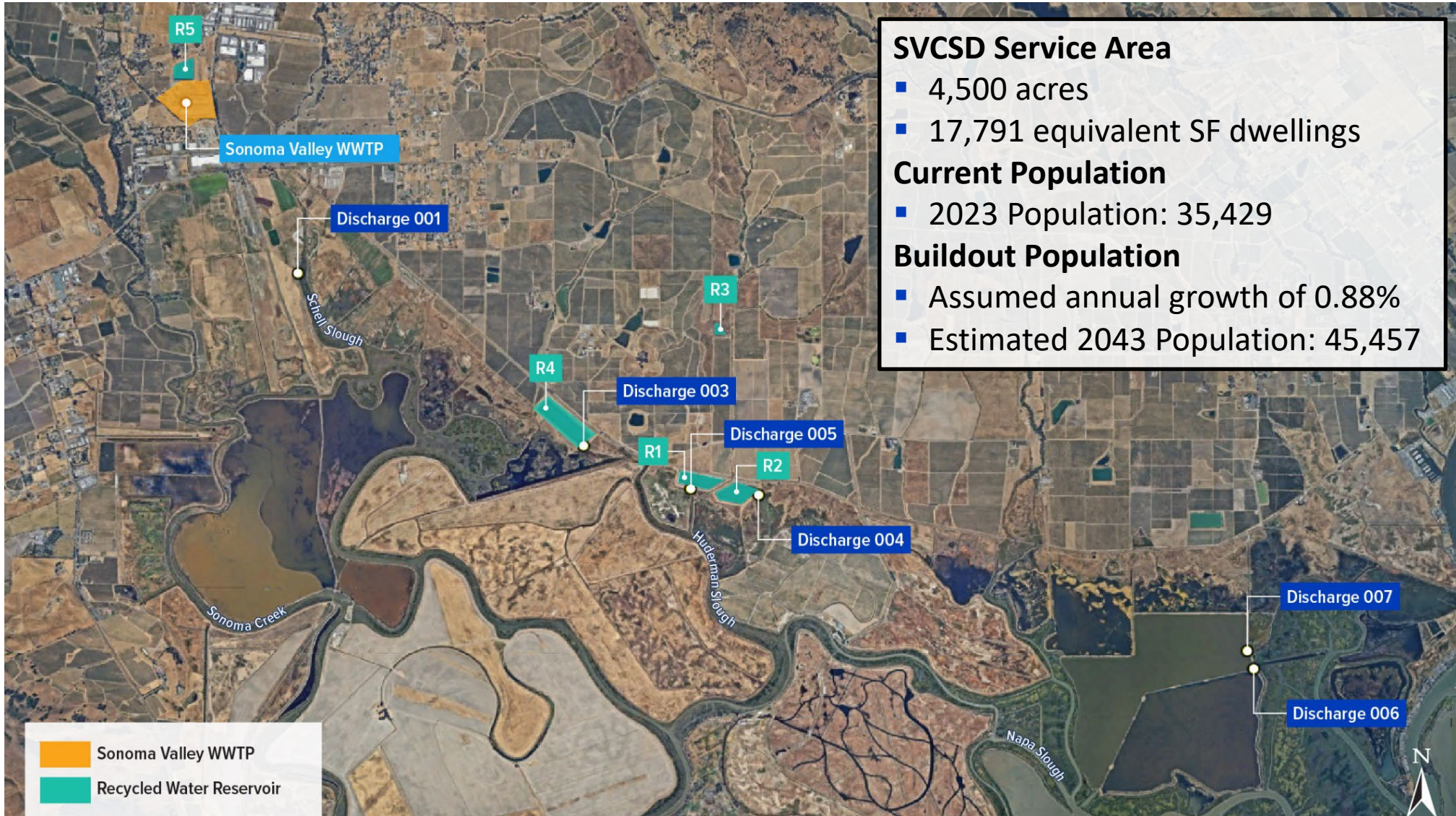
Source: "Sonoma Valley County Sanitation District," Sonoma Water, accessed April 29, 2024, <https://www.sonomawater.org/alwsz>.

# Sonoma Valley WWTP Background

- Began operation in 1953
- Service Area = ~4,500 acres
- Facility Permitted Flow (ADWF)
  - 3.0 mgd
- Facility Design Flow
  - 16.0 mgd (PWWF)



# Sonoma Valley WWTP





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# Asset Management Program

# 2018

Sonoma Water initiated the development of an Asset Management (AM) Program to improve data collection and integration, resulting in proactive and informed decisions for efficient long-term infrastructure planning.



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## Audience Question No. 1

Are Sonoma Water's AM Program  
drivers important for you?



# AM Program Implementation Phases

## Phase 1: Develop

**2019-2021**

Charter

Commitments

AM

Implementation

Plan

## Phase 2: Pilot

**2021-2022**

AM Plans

CMMS Eval.

BSI

## Phase 3: Refine

**2022-2025**

CMMS

Implementation

BSI

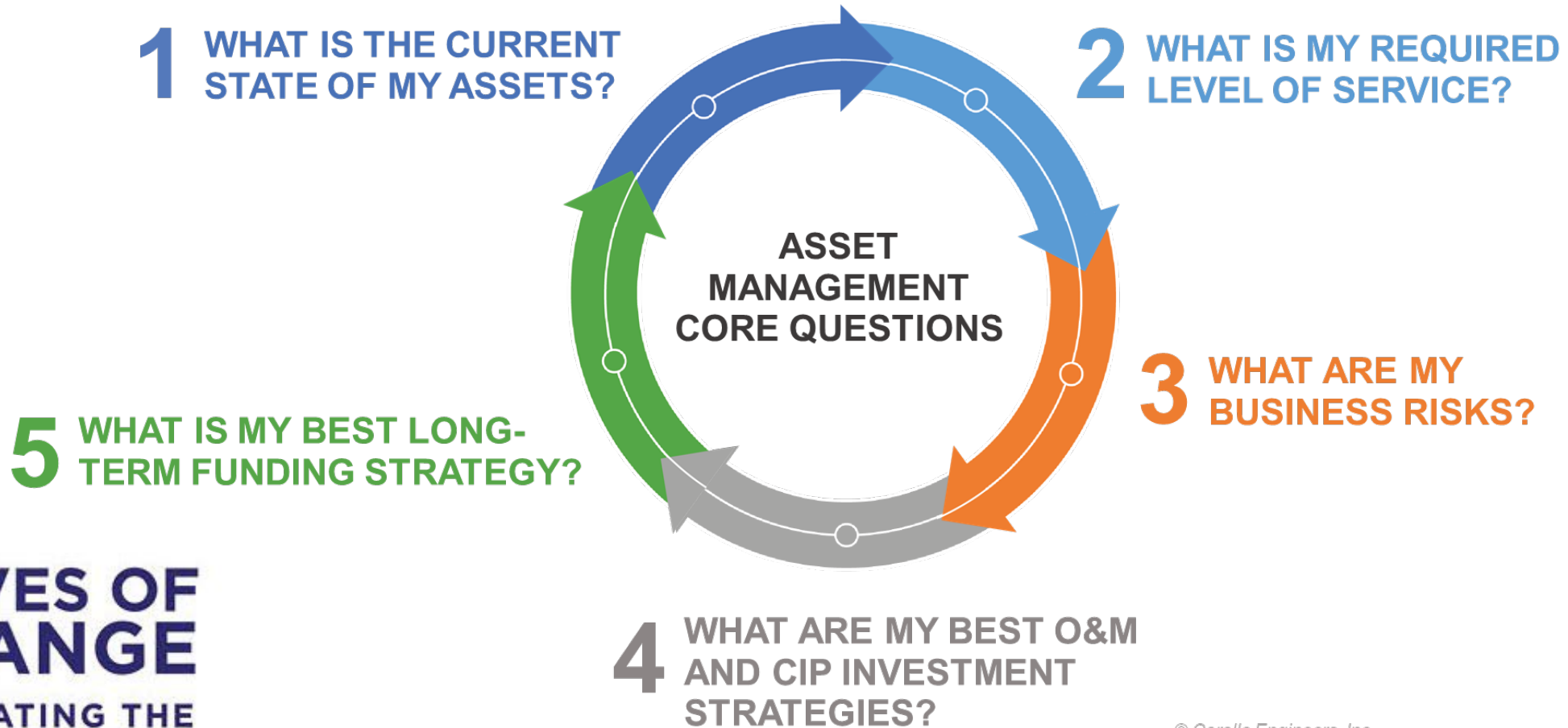
Development

More AM Plans

# Components of the AM Implementation Plan

- AM framework
- Business system integration (BSI)
- Computerized maintenance management system (CMMS) evaluation

# AM Framework

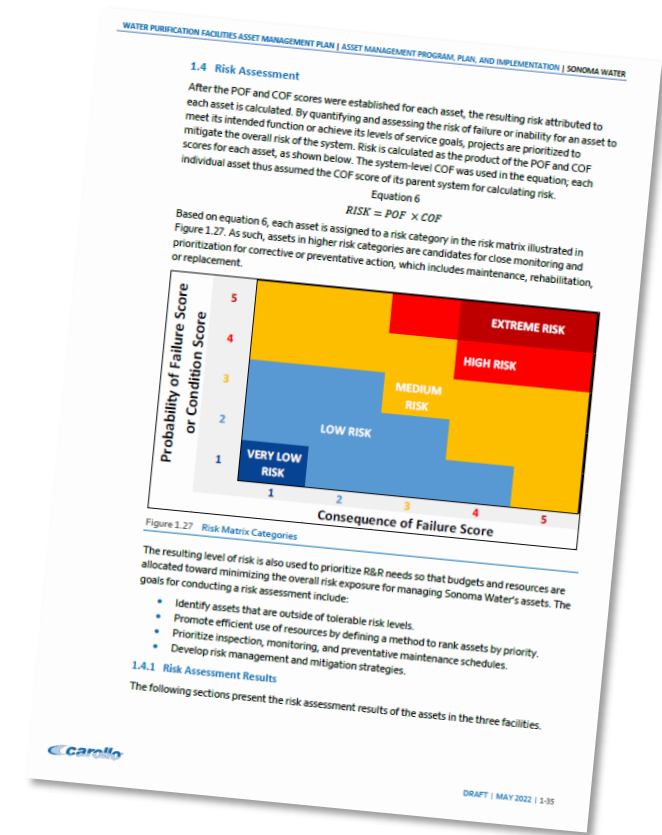


# AM Plan

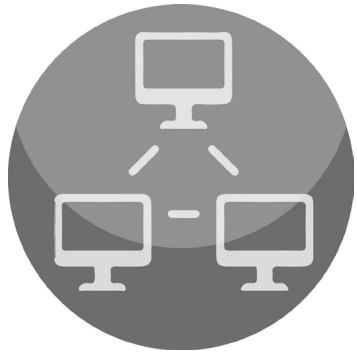
Condition Assessments are documented in AM Plans



1. Introduction
2. Probability of Failure
3. Consequence of Failure
4. Risk Assessment
5. R&R Forecast (20-Year CIP)
6. Near-Term Recommendations



# BSI



## Phase 1

- Identified recommendations to improve existing software systems, data management, and workflows

## Phase 2

- Developed framework for integration of data and software applications including GIS, SCADA, CMMS, and finance
- Created dynamic AM Dashboard

Water Supply

# SONOMA WATER ASSET MANAGEMENT DASHBOARD



FUND  
All

FACILITY  
All

SYSTEM  
All

ASSET TYPE  
All

Select Risk Type  
 Asset Score  
 System Score

Assets  
1030

Project Cost  
0

Physical  
0.90

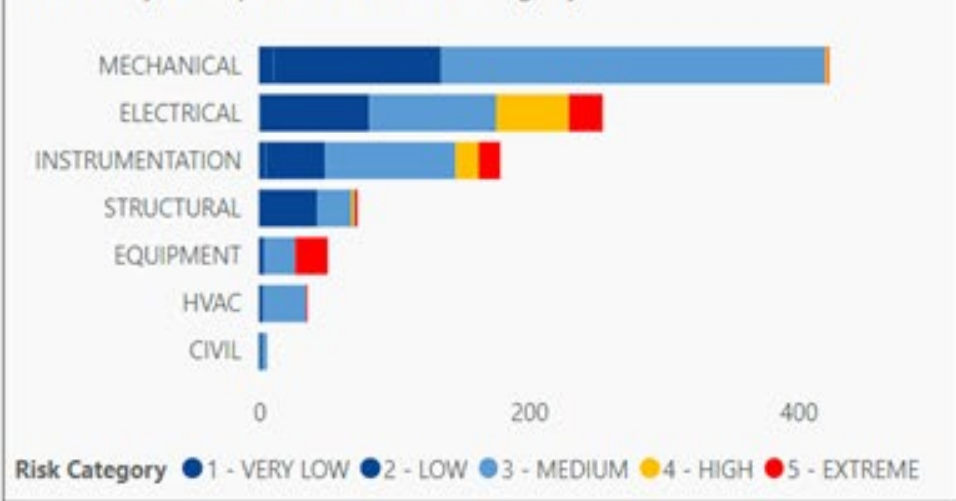
Performance  
0.67

POF  
3.63

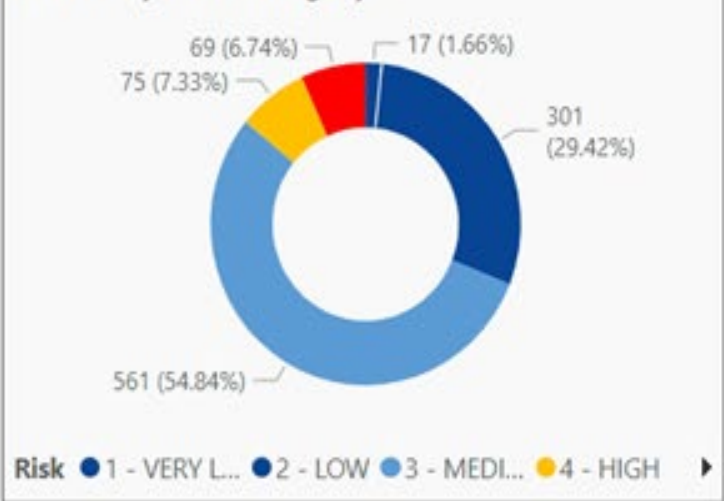
COF  
2.23

Risk  
3.11

Assets by Discipline and Risk Category



Assets by Risk Category



Risk Matrix

COF \ POF	1	2	3	4	5	Total
5	159	139	61	23	46	428
4	68	119	3	2	12	204
3	36	24	10	2	10	82
2	80	53	39	5	25	202
1	17	18	21	30	21	107
<b>Total</b>	<b>360</b>	<b>353</b>	<b>134</b>	<b>62</b>	<b>114</b>	<b>1023</b>

Master_ID	Facility	System	Discipline	Asset Type	Physical	Perf	POF	COF Asset	COF System	Risk Asset Category	Risk Asset Score	Risk System Category	Risk S...
1037	Mirabel	PP5 - MRBL PMPING PLAN...	MECHANICAL	CONTACTOR	0	0	5	1	3	3	5	4	
1038	Mirabel	PP5 - MRBL PMPING PLAN...	MECHANICAL	CONTACTOR	0	0	5	1	3	3	5	4	
1039	Mirabel	PP5 - MRBL PMPING PLAN...	MECHANICAL	CONTACTOR	0	0	5	1	3	3	5	4	
1040	Mirabel	PP5 - MRBL PMPING PLAN...	ELECTRICAL	TRANSFORMER	2	2	2	4	3	3	8	2	
1042	Mirabel	PP5 - MRBL PMPING PLAN...	MECHANICAL	MOTOR	3	3	3	2	3	2	6	3	
1043	Mirabel	PP5 - MRBL PMPING PLAN...	MECHANICAL	MOTOR	3	3	3	2	3	2	6	3	

# CMMS Evaluation and Selection



## Phase 1

- Evaluated existing CMMS practices and identified additional needs

## Phase 2

- Determined CMMS Requirements
- Developed RFP for CMMS Vendors
- Evaluation and Selection:
  - Over a dozen proposals received
  - Four vendors selected for interviews
  - Interviews held in August 2022



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# Sonoma Valley AM Plan

# Condition Assessment Approach



## Asset Register

- Request and review existing information
- Link to Sonoma Water's CMMS or GIS, as appropriate
- Develop digital, tabular register for condition assessment

## On-Site Inspection

- Conduct on-site visual condition assessment of plant and reclamation facilities.
- Two-day inspection to gather data, take pictures, and apply asset management framework

## Risk Analysis

- Use probability of failure and consequence of failure for prioritization of capital and operational needs
- Assign assets to risk categories to facilitate prioritizing

## CIP

- Group capital and maintenance needs into infrastructure improvement projects
- Calculate planning level costs and develop CIP recommendations

# On Site Inspection

- Evaluated assets that met the following criteria:
  - Minimum purchase/replacement cost of \$2,500 AND
  - Minimum estimated useful life of 2 years OR
  - Critical to the system it supports
- Assessment included:
  - Collecting photos of assets
  - Scoring assets on a 1-5 scale
  - Documenting findings and recommendations
  - Noting decommissioned and “new” (to CMMS) assets, etc.



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## Audience Question No. 2

How many assets do you think  
were evaluated at SVTP?

# SVTP Asset Register



- 66 Electrical assets
  - Generators, MCCs, switchgears, transformers, VFDs, etc.
- 66 Instrumentation assets
  - Analyzers, meters, etc.
- 381 Mechanical assets
  - Blowers, belt press, pumps, etc.
- 27 Structural assets
  - Basins, tanks, vaults, etc.

# Probability of Failure (POF) Score

Condition  
Based



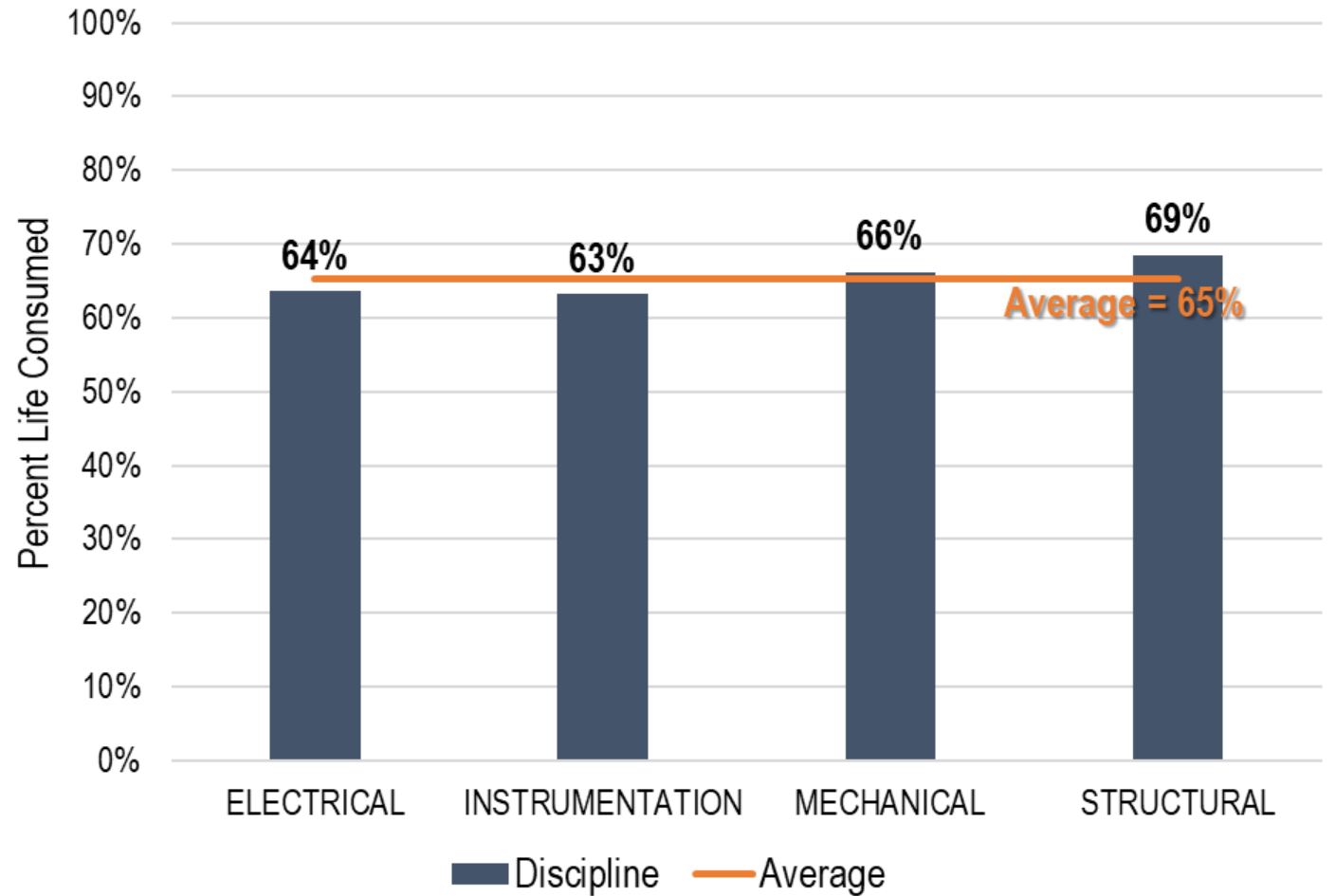
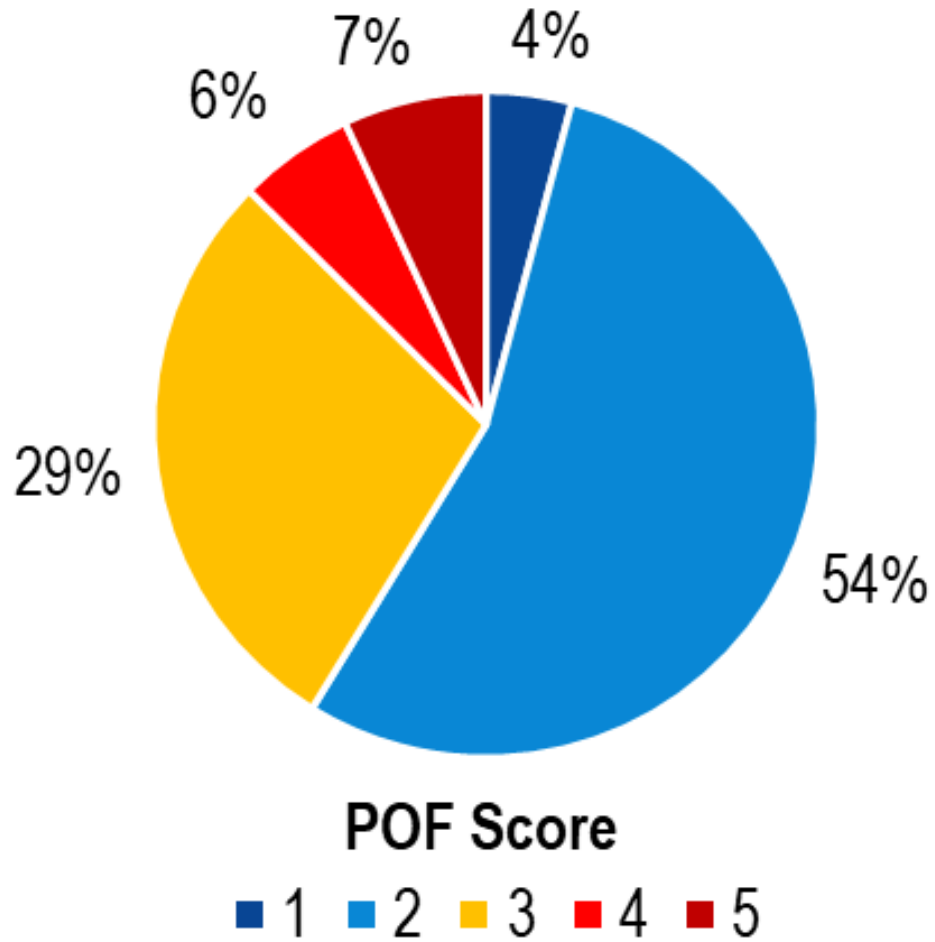
Age  
Based

POF Score	Description of POF Score	Percent Life Consumed
1	Good	0%
2	Acceptable	40%
3	Fair	65%
4	Poor	80%
5	Failed	90%

*“...likelihood of an event happening at a point in time...can be determined qualitatively or quantitatively from...Asset age, performance and Condition Assessment results, operation and maintenance history...”*

– AWWA AM Definitions Guidelines (2018)

# POF Failure Results



# Risk Analysis

*When will it fail?*

**Mortality  
Capacity  
Efficiency  
Service**

**POF**

**X**

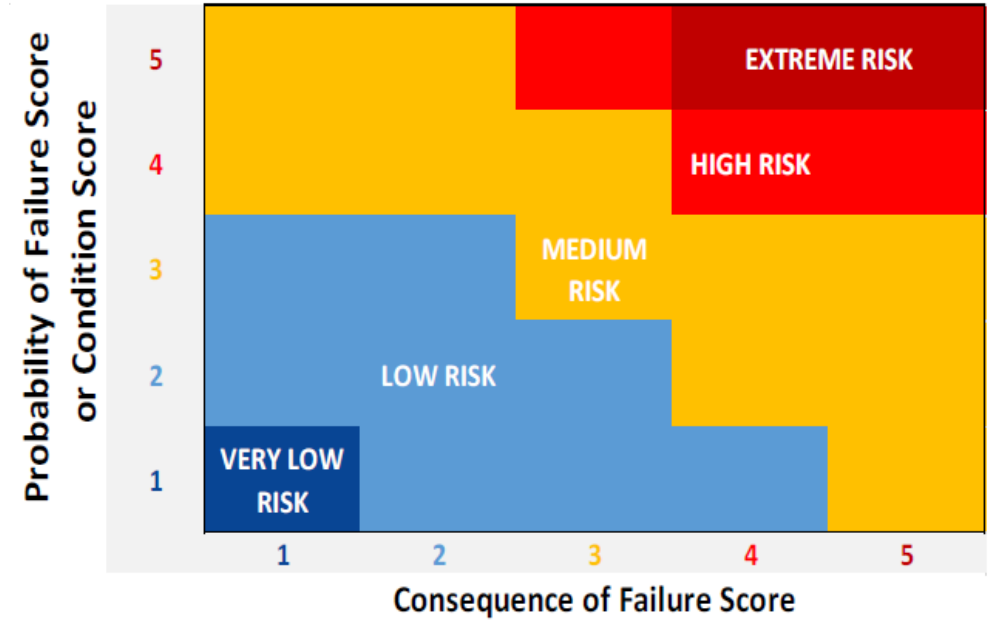
*Potential impacts?*

**Social  
Economic  
Environmental**

**COF**

**=**

*What risk is tolerable?*



**Business Risk Exposure (BRE)**

# Consequence of Failure (COF)

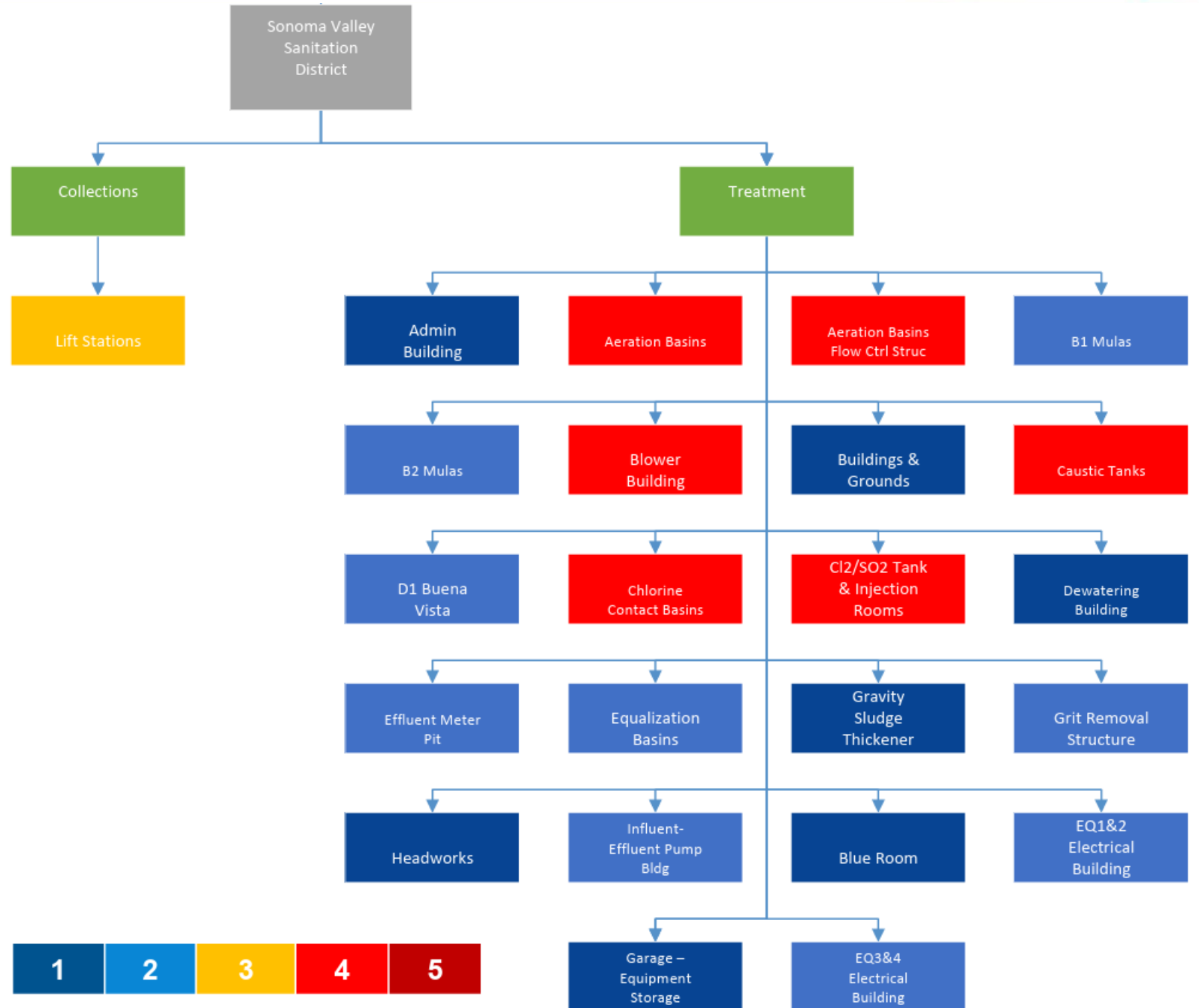
*“...measure of the direct and/or indirect costs of Asset failure...”*

– AWWA AM Definitions Guidelines (2018)



Consequence Category	1-Very Low	2-Low	3-Moderate	4-High	5-Very High
<b>Financial</b>					
<b>Unintended Costs</b> (sub-criteria may vary by district or zone)	0.5 percent of Revenue or ≤\$250k or ≤\$50k/yr	1.0 percent of Revenue or ≤\$1M or ≤\$200k/yr	5.0 percent of Revenue or ≤\$3M or ≤\$500k/yr	10 percent of Revenue or ≤\$10M or ≤\$1M/yr	>10 percent of Revenue or >\$10M or >\$1M/yr
<b>Operational Impacts</b> (criteria may vary by district or zone)	No impact / 1 full time equivalent (FTE) < 1 day	≥ 1 day / 1 to 2 FTEs	< 1 week / ≥ 2 FTEs / Emergency Contract <\$50k	> 1 week / ≥ 2 FTEs / Emergency Contract ≥\$50k	Entire plant down, 1+ weeks
<b>Social</b>					
<b>Health and Safety</b>	Minor injury no lost time	Reportable injury <3 days loss	Significant injury short-term hospitalization	Serious injury lifelong disability	Fatality
<b>Reputational</b>	Departmental management attention	Senior manager attention	Attention from Stakeholders / Adverse local media	Significant Stakeholders attention / Sustained local media	Sustained criticism / Protracted local and national media
<b>Environmental</b>					
<b>Compliance</b>	Internal notification only	External notification required	External investigation	Requires fundamental change	Major breach / Severe fines

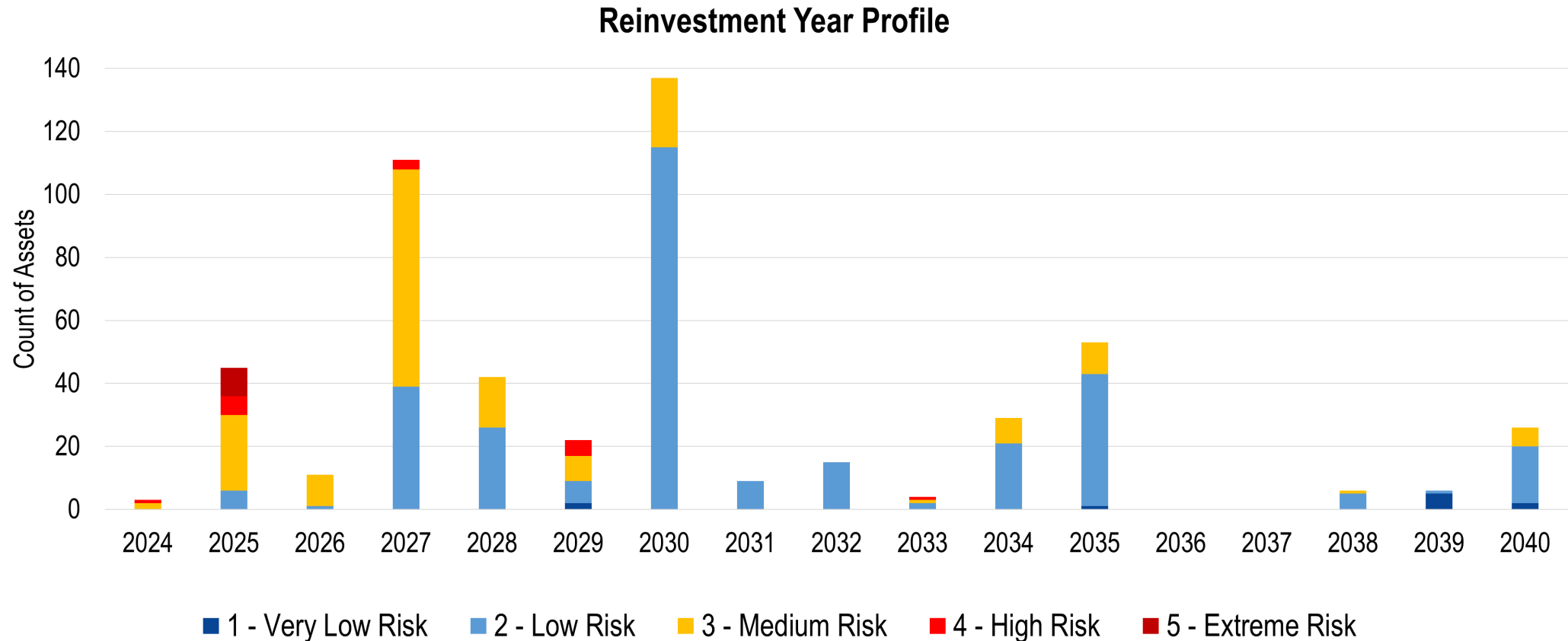
# COF Results



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# Condition Assessment Results



# CIP Recommendations

- Replacement and rehabilitation (R&R) timing is determined from condition assessment results
- Assets are grouped into CIP recommendations based on process area and R&R needs
- CIP recommendations can be prioritized using risk





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# Master Plan

Planning and CIP Development



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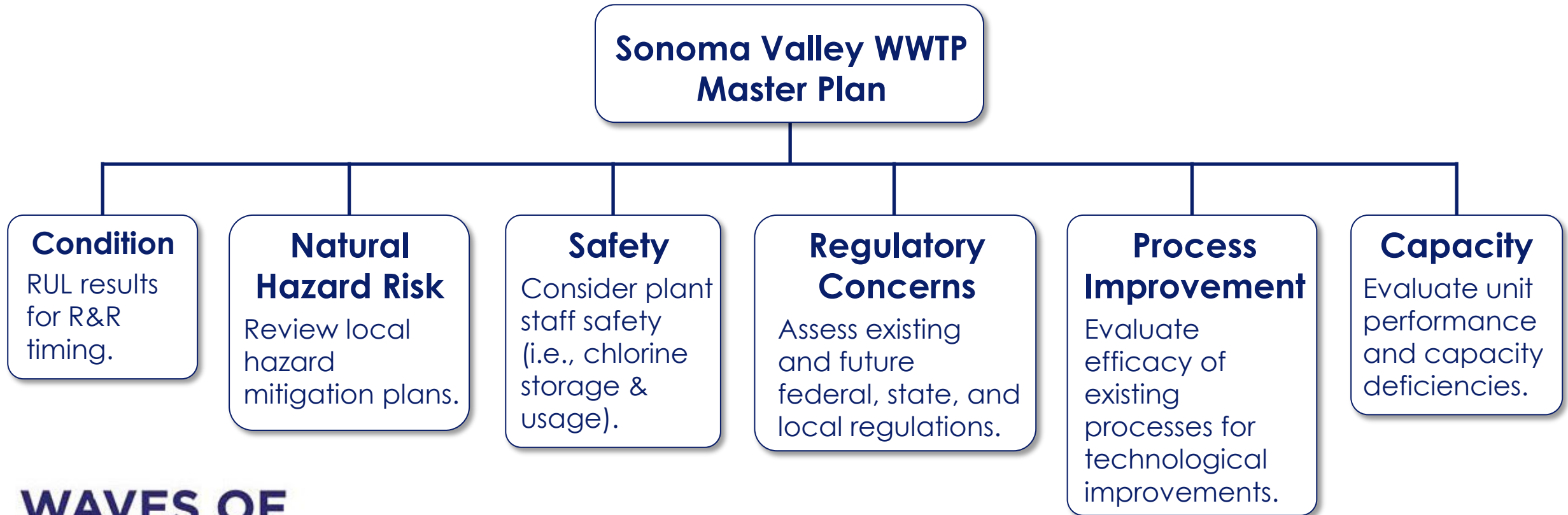
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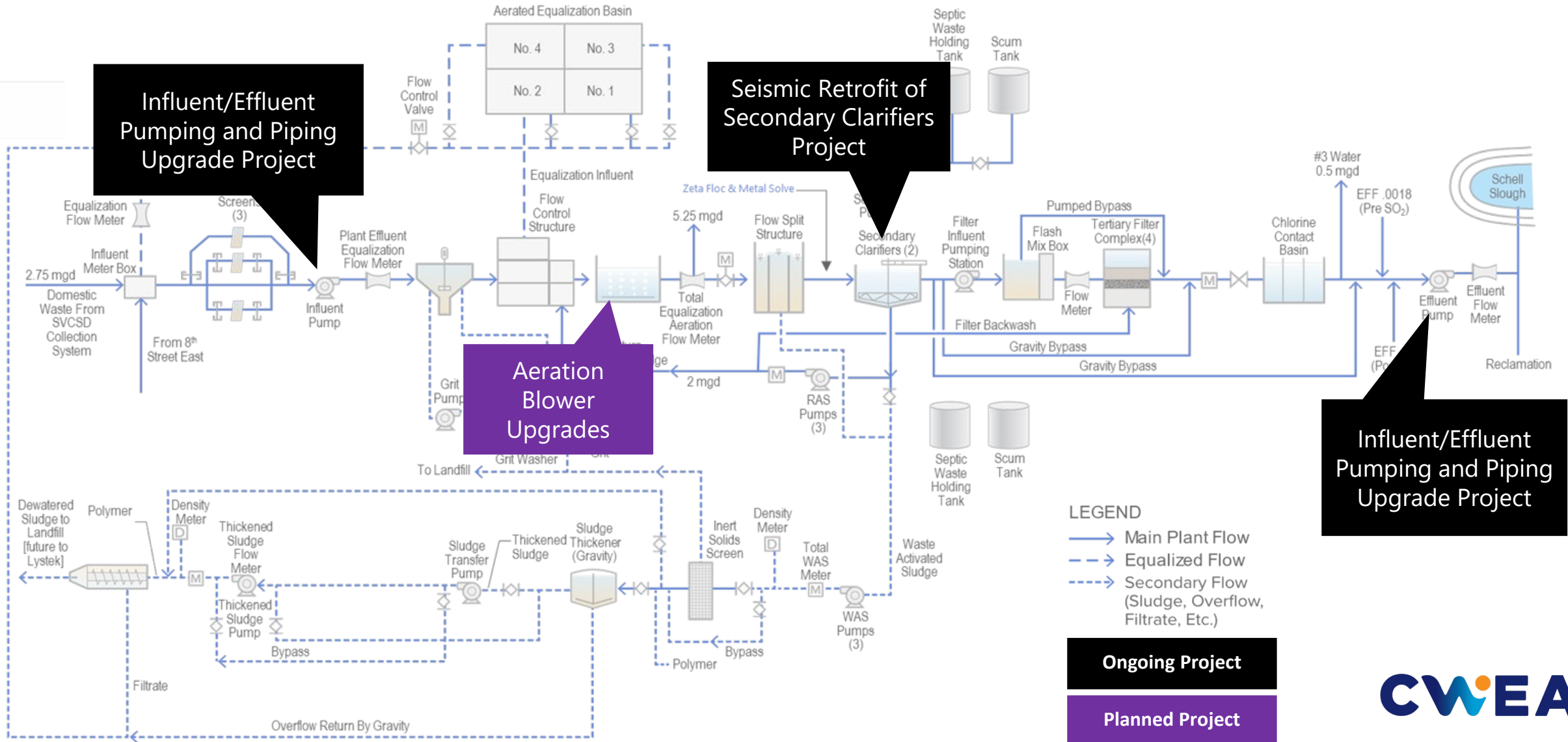
## Audience Question No. 3

What is a standard master  
planning horizon?

# Master Plan Drivers

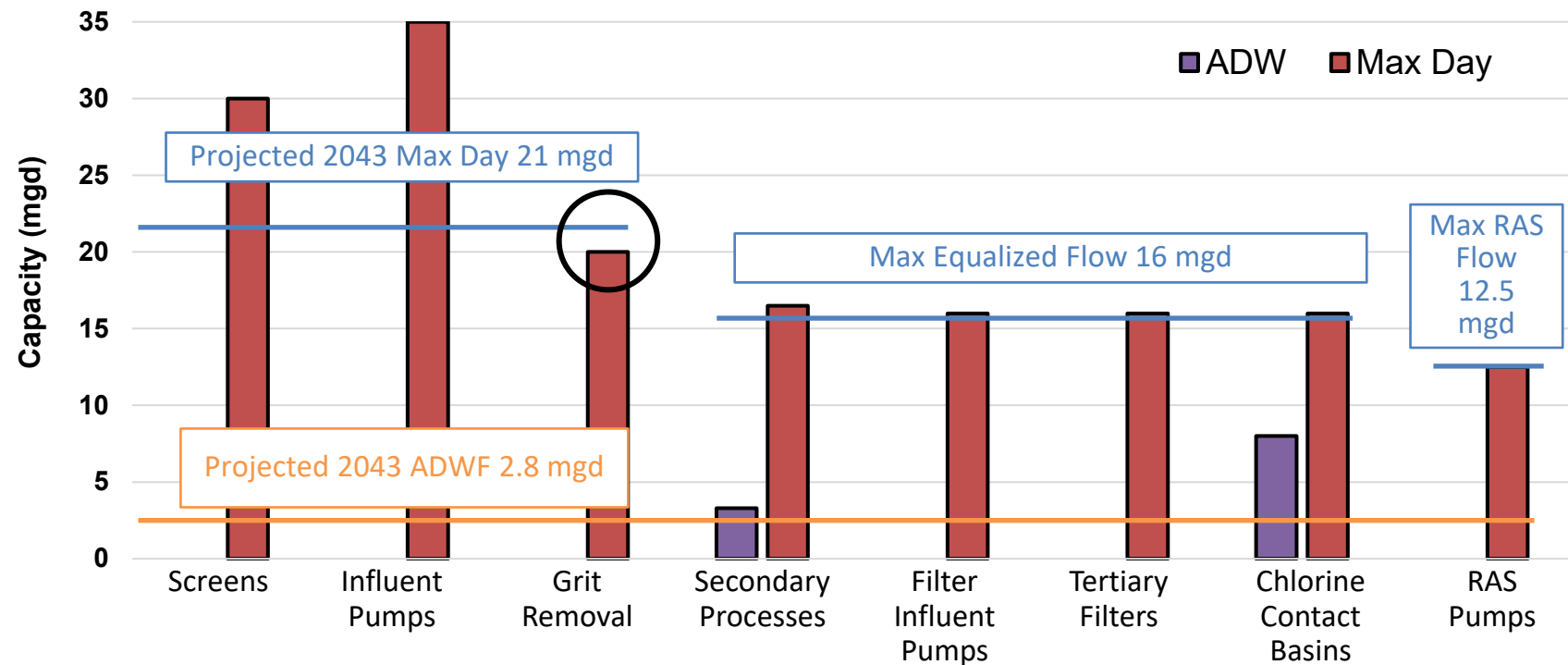


# Ongoing and Planned Projects



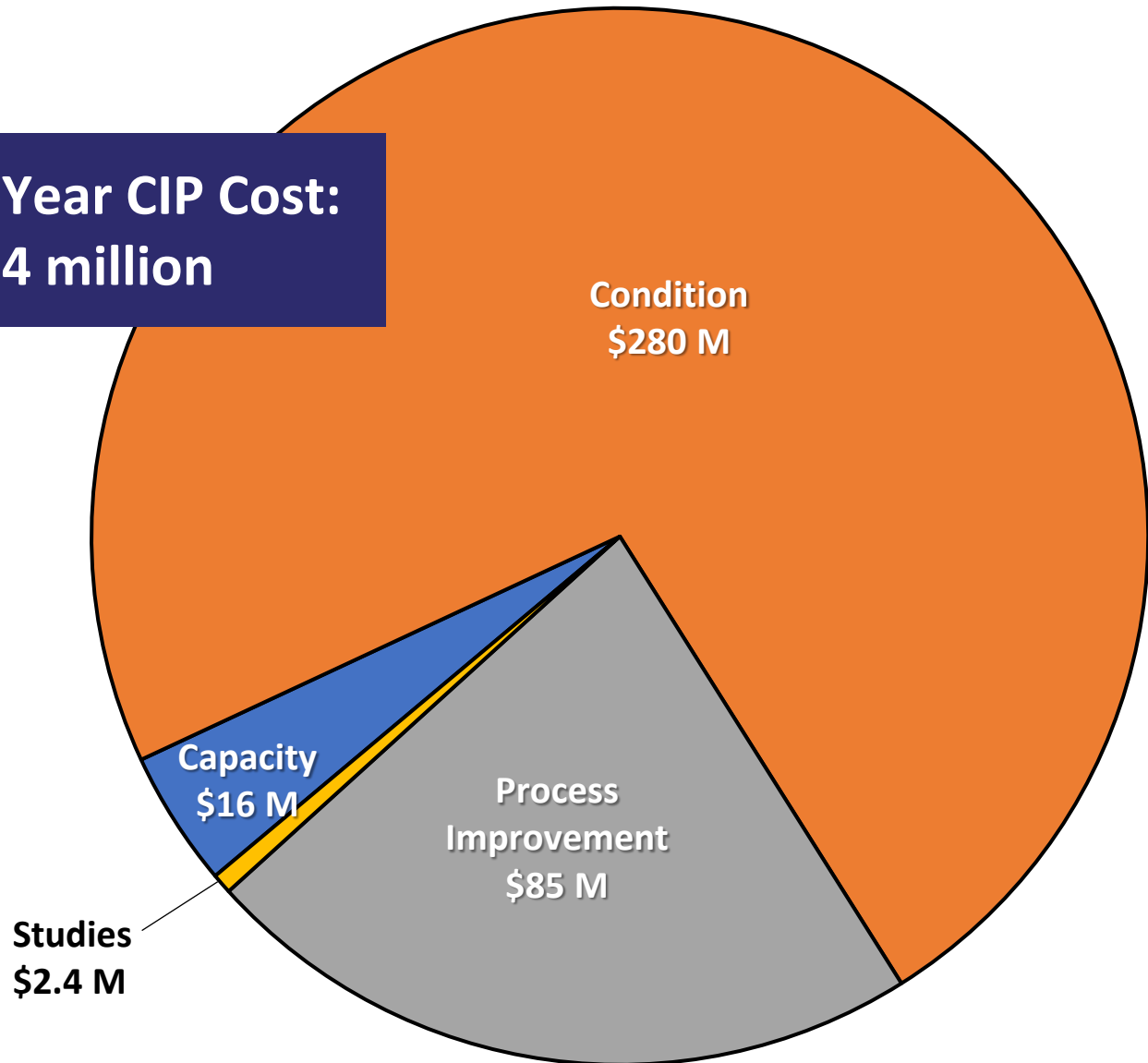
# Master Planning Key Evaluations

- Performance Evaluation
  - 5-year analysis of historical plant data
    - Overall performance – effluent discharge compliance
    - Unit process performance – loading rates, surface overflow rates
- Capacity Assessment
  - Develop flow and load projections
  - Assess projections with existing capacity
  - Develop BioWin model



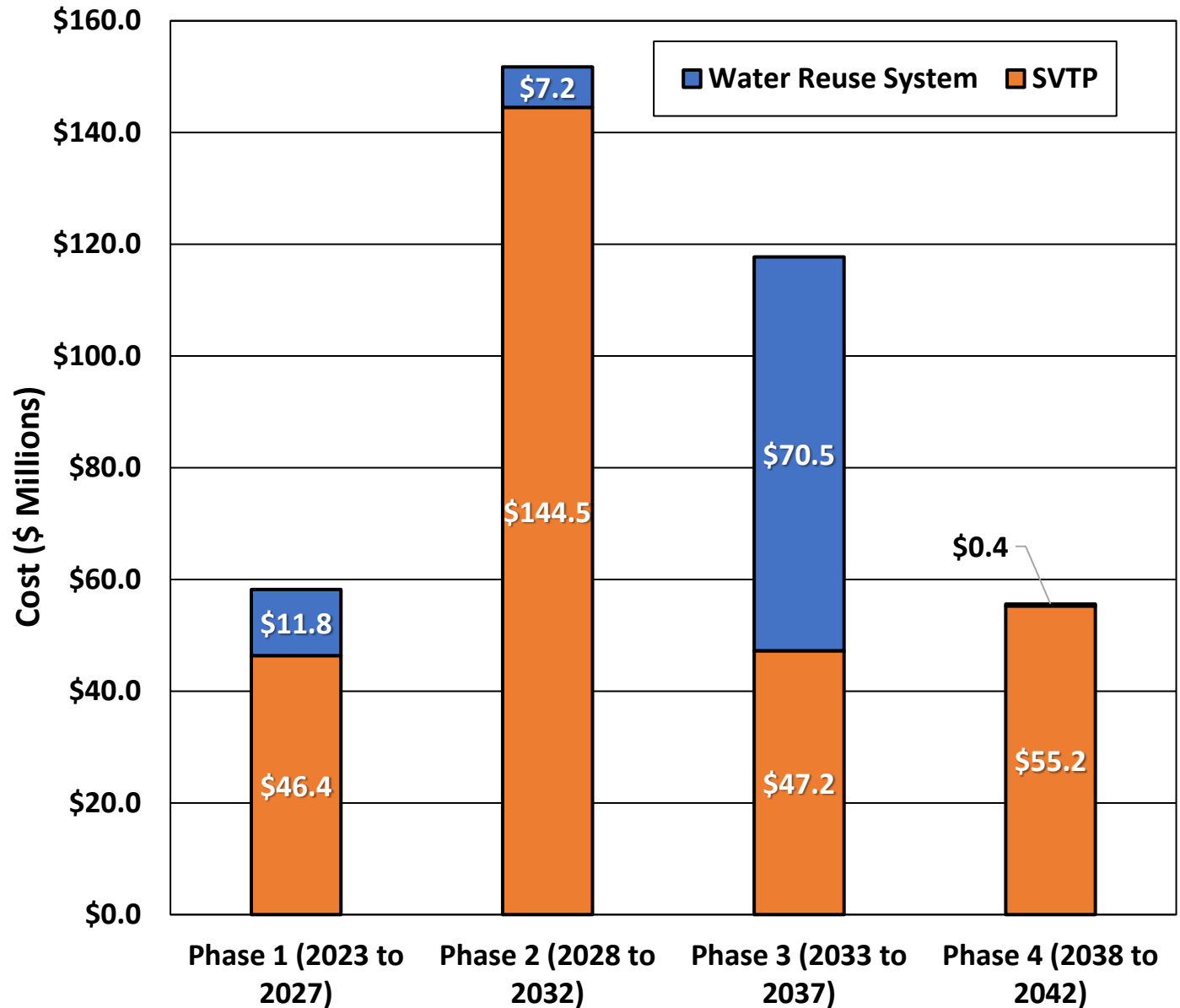
# Capital Improvement Plan (CIP) Overview

**Total 20-Year CIP Cost:  
\$384 million**



# CIP Phasing

- Approach:
  - Identify projects for SVTP and water reuse system needed over 20-year planning period based on results of this Master Plan
- Purpose:
  - Develop Class 5 cost estimates and organize phasing for recommended projects
- Total Estimated CIP Costs: \$384 million
  - Estimated planning level costs (Class 5).



# Lessons Learned and Conclusions

- Sonoma Water AMP provided effective asset management across multiple plants and facilities
- Leveraged condition assessment results for long-term master planning
- Developed CIP for future planning